# CASE REPORTS

Refer to: Miser JS, Robertson WO: Ipecac poisoning. West J Med 128:440-443, May 1978

## Ipecac Poisoning

JAMES S. MISER, MD
*Columbus, Ohio*
WILLIAM O. ROBERTSON, MD
*Seattle*

THE USE OF syrup of ipecac in managing accidental ingestions of drugs in children is now widely recommended. Dabbous and co-workers[1] showed that the syrup of ipecac was more effective than mechanically induced vomiting; other authors have shown ipecac to be more effective than gastric lavage.[2,3] Because delay in gastric evacuation is directly related to increased drug absorption, syrup of ipecac is presently recommended for use in the home, thereby avoiding the delays of transit to the hospital. The usual therapeutic dose for children is 15 to 30 ml; it may be repeated in 20 to 30 minutes if emesis has not occurred. At this dose, syrup of ipecac is safe in the treatment of acute ingestions. In contrast the fluid extract form of ipecac is 14 times as concentrated as the syrup form and its use has been associated with severe toxicity and fatalities. For this reason fluid extract of ipecac was removed from the *United States Pharmacopoeia* in the mid-1960's. Nonetheless, we have recently seen a three-year-old child who became ill after ingesting fluid extract of ipecac administered inadvertently in treating an accidental ingestion of propoxyphene napsylate (Darvon-N®).

### Report of a Case

A three-year-old black boy was admitted to the Children's Orthopedic Hospital and Medical Center in Seattle in status epilepticus. Except for an episode one year before admission of a temperature of 40.6°C (105°F) associated with seizure activity, the child's past medical history was normal. A subsequent electroencephalogram showed no abnormalities and anticonvulsant therapy had not been instituted. The patient was well until the evening before admission when he ingested three 100-mg tablets of propoxyphene napsylate. Upon discovery of powder on his face and an open medication container, his mother called the Poison Control Center at the Children's Orthopedic Hospital and was instructed (1) to obtain syrup of ipecac as quickly as possible, (2) to administer one tablespoon of the syrup to the patient followed by water and (3) to repeat the dose once if vomiting had not commenced in 15 to 20 minutes. The child's 12-year-old cousin was sent to a local pharmacy for the syrup of ipecac. The pharmacist had no small bottles of syrup of ipecac, but he did have a half-filled old brown bottle labeled "Ipecac," which he sold to the cousin. One tablespoon of the bottle's content was administered to the patient. When the child failed to vomit in 20 minutes, a second tablespoon was almost administered, but the patient refused the offering and soon began to vomit. He continued to vomit throughout the next 12 hours and 6 hours before admission profuse watery diarrhea developed. One hour before admission, opisthotonic generalized convulsions occurred.

After control of the seizure an initial physical examination was carried out. The child was moderately alert; tachypnea was noted. The pulse rate was 140 beats per minute; respirations, 35 per minute; blood pressure, 110/80 mm of mercury, and temperature, 38.7°C (101.7°F). The skin was dry with some tenting but the mucous membranes were moist. There was erythema of the posterior pharyngeal mucosa. Examination of the heart and lungs gave normal findings except for tachycardia and tachypnea. Examination of the abdomen showed generalized tenderness without guarding or rebound tenderness; bowel tones were normal. The remainder of the physical examination showed no abnormalities.

Laboratory studies gave the following findings: hematocrit, 46 percent; leukocyte count, 45,800 per cu mm with increased immature polymorphonuclear leukocytes with toxic granulation and vacuolization; platelet count, adequate; serum sodium, 153 mEq per liter; potassium, 4.5 mEq per liter; chloride, 119 mEq per liter; bicarbon-

From the Department of Pediatrics, University of Washington, Children's Orthopedic Hospital and Medical Center, Seattle. Dr. Miser is now in practice in Columbus, Ohio.

Submitted November 18, 1977.

Reprint requests to: James S. Miser, MD, Childrens Hospital, 700 Childrens Drive, Columbus OH 43205.

ate, 9 mEq per liter; blood glucose, 3 mg per dl; blood urea nitrogen, 42 mg per dl; arterial oxygen pressure, 75 mm of mercury; carbon dioxide pressure, 27 mm of mercury; pH, 7.32; serum glutamic oxaloacetic transaminase, 47 IU, and serum glutamic pyruvic transaminase, 12 IU. Cultures of urine, stool, blood, and cerebrospinal fluid specimens all proved negative. Stool was guaiac positive. An x-ray film of the chest showed no abnormalities; air fluid levels in the small bowel lumen were seen on films of the abdomen.

The patient was treated first with intravenously given glucose and phenobarbital at a dose of 5 mg per kg of body weight per day; an electroencephalogram made six days later showed diffuse slowing. Watery diarrhea persisted for ten days; however, fluid and electrolyte status improved over the first three days in hospital. An upper gastrointestinal series of roentgenograms gave normal findings and sigmoidoscopy showed diffuse colitis. During his hospital course other abnormalities were noted: T wave inversion on an electrocardiogram, muscle tenderness with mild weakness, transaminasemia, hypoalbuminemia, an initial leukocytosis and granulocytosis followed by neutropenia with a granulocyte count of 950 per cu mm, pseudo-Pelger-Huet cells, thrombocytopenia with a platelet count of 40,000 per cu mm and anemia with a hematocrit reading of 28 percent. Bone marrow examination showed vacuolization of the myeloid percursors, hyperpyknosis and hypersegmentation of the nuclei of the neutrophils, mild hypoplasia of the erythroid series, and normal megakaryocytes.

After two days in hospital the unwitting substitution of the fluid extract of ipecac for the syrup of ipecac was discovered. With careful monitoring and supportive care all signs, symptoms, and abnormal laboratory findings resolved and the child was discharged after two and a half weeks in hospital. Follow-up examinations have shown normal growth, normal development, and normal hematologic profiles.

After the discovery of the substitution of the fluid extract for the syrup, the local pharmacy, the state board of pharmacy and the National Clearinghouse of Poison Control Centers were notified.

## Discussion

The first reported case of poisoning due to ipecac was published in 1908 by Harrison.[4] The physician's stable boy had pilfered and consumed the fluid extract of ipecac, which caused uncontrollable vomiting and death. Since that time 12 more cases of ipecac poisoning have been reported, 9 due to the fluid extract form and 3 due to the syrup form. Although Thoman and Verhulst[5] reported syrup of ipecac safe and efficacious in acute phenothiazine poisoning, all three of the cases of poisoning due to the syrup of ipecac occurred following previous phenothiazine overdoses, drugs known for their antiemetic properties. In each case there was evidence of cardiac toxicity. Two of these cases were not reported in detail;[6] in the third case there was evidence of atrial irritability and T wave inversion.[7]

The remaining nine cases were due to the ingestion of the fluid extract of ipecac, which resulted in four deaths and severe toxicity (see Table 1) including protracted vomiting and diarrhea; gastrointestinal bleeding and ulceration; esophageal stricture; fluid and electrolyte abnormalities; pneumonia; cardiac toxicity consisting mainly of tachycardia, atrial irritability and ST-T wave abnormalities on electrocardiograms; hematologic abnormalities involving all cell lines; and seizures. The effects of ipecac are the result of its main contents, cephaline and emetine, though they may also be due to psychotrine, hydroipecamine and ipecamine—other alkaloids present in small amounts.

In our patient many of these reported toxic effects were seen. He presented in status epilepticus and was noted at the same time to be hypoglycemic. Emetine has been reported *in vitro* to inhibit glycogen synthesis and gluconeogenesis.[8] *In vivo* studies in rats have shown decreased liver glycogen stores in emetine-treated rats.[8] Bates and Grunwaldt's[9] second patient had seizures which stopped when glucose was administered, suggesting that hypoglycemia may have been a cause of seizures. In our patient convulsions stopped after intravenous administration of glucose and an anticonvulsant. As occurred in our patient, diarrhea and vomiting have been reported in all the cases of poisoning due to the fluid extract of ipecac. In 11 of the 14 patients some cardiac toxicity was noted; in our patient only T wave changes on electrocardiograms were noted. Goodman and Gilman[10] state that neuromuscular aching, tenderness and stiffness of skeletal muscles may occur as a result of emetine ingestion. In our patient exquisitely tender skeletal muscles developed, a symptom that resolved slowly over

TABLE 1.—*Clinical Manifestations of Ipecac Poisoning*

| Case | Author | Date | Age | Fluid or Syrup | Ingestion Caused Death | Gastrointestinal | Cardiovascular System | Nervous System | Other |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Harrison RT[4] ..... | 1908 | 20 years | Fluid | yes | Vomiting | Rapid pulse | ..... | ..... |
| 2. | Allport RB[11] ..... | 1959 | 2½ years | Fluid | no | Vomiting, melena | ST-T wave changes | Seizures | Leukopenia, esophageal stricture |
| 3. | Smith RP et al[13] ..... | 1961 | 4 years | Fluid | yes | Vomiting, diarrhea | Shock | Confusion | Renal damage |
| 4. | Bates T et al[9] ..... | 1961 | 4 years | Fluid | yes | Vomiting | ST-T wave changes | ..... | Hematologic, hematuria |
| 5. | ..... | 1961 | 34 months | Fluid | no | Vomiting, diarrhea | None | Seizures | Leukocytosis |
| 6. | MacLeod J[7] ..... | 1963 | 23 months | Syrup | no | None | T wave abnormalities | ..... | ..... |
| 7. | Speer JD et al[12] ..... | 1963 | 3½ years | Fluid | no | Vomiting | None | ..... | ..... |
| 8. | ..... | 1963 | 3 years | Fluid | yes | Vomiting, gastrointestinal bleeding | ST-T wave changes | Seizures, apnea | Leukocytosis, renal damage |
| 9. | ..... | 1963 | 2½ years | Fluid | no | Vomiting, gastrointestinal bleeding | None | ..... | ..... |
| 10. | Bourianoff G[6] ..... | 1971 | .... | Syrup | no | None | Yes | ..... | ..... |
| 11. | ..... | 1971 | .... | Syrup | no | None | Yes | ..... | ..... |
| 12. | Rose NJ[14] ..... | 1970 | 19 months | Fluid | yes | Diarrhea | Shock | Seizures, lethargy | ..... |
| 13. | Manno B et al[15] ..... | 1977 | 7 months | Fluid | no | Vomiting, diarrhea | Tachycardia | ..... | ..... |
| 14. | Miser JS et al ..... | 1978 | 3 years | Fluid | no | Vomiting, diarrhea | T wave changes | Seizures | Hematologic, hypoglycemia, muscle tenderness |

one month. Several authors have reported hematologic effects[9,11,12] of ipecac toxicity. We observed an initial leukocytosis and then a pronounced neutropenia, reticulocytopenia, anemia and thrombocytopenia which resolved gradually over one month. Bone marrow examination showed pseudo-Pelger-Huet cells, toxic granulation and vacuolization of the granulocyte series, mild erythroid hypoplasia and a normal megakaryocyte series.

Investigation of the inadvertent drug substitution uncovered the facts that the bottle of fluid extract of ipecac had been manufactured in 1959 and distributed by a wholesaler shortly thereafter. It had been reshelved by the retailer in the mid-1960's and, purportedly, the dispensing pharmacist was unaware of any difference in the potential toxicities of the two forms. Subsequently professional efforts were initiated to eliminate a repetition of this unfortunate occurrence by notification of all pharmacies throughout the state of Washington.

It is important to note that there are strikingly few cases of toxicity due to the syrup of ipecac considering that it is now widely used in the treatment of acute drug ingestion. It is necessary for the health care system to institute "fail-safe" mechanisms to avoid all forms of error in drug therapy. Continuous monitoring by public agencies, professional organizations and individual health professionals is mandatory in our increasingly complex chemical environment.

## Summary

We report a case of poisoning due to the unwitting substitution of fluid extract of ipecac for syrup of ipecac in the management of acute propoxyphene napsylate (Darvon®) ingestion. We also review the reports in the literature of ipecac poisoning and summarize the clinical manifestations; they include protracted vomiting, diarrhea, gastrointestinal bleeding and ulceration, esophageal stricture, fluid and electrolyte abnormalities, cardiac toxicity, hematologic toxicity, seizures, hypoglycemia, muscle tenderness, shock and death.

### REFERENCES

1. Dabbous IA, Bergman AB, Robertson WO: The ineffectiveness of mechanically induced vomiting. J Pediatr 66:952-954, 1965

2. Arnold FJ, Hodges JE, Barta RA, et al: Evaluation of the efficacy of lavage and induced emesis in treatment of salicylate poisoning. Pediatrics 23:286-301, 1959

3. Boxer L, Anderson FP, Roe DS: Comparison of ipecac-induced emesis with gastric lavage in the treatment of acute salicylate ingestion. J Pediatr 74:800-803, 1969

4. Harrison RT: A case of ipecacuanha poisoning? Lancet 2: 536, 1908

5. Thoman ME, Verhulst HL: Ipecac syrup in antiemetic ingestion. JAMA 196:433-434, 1966
6. Bourianoff G: No time for ipecac. Emergency Med 3:5, 1971
7. MacLeod J: Ipecac intoxication—Use of a cardiac pacemaker in management. N Engl J Med 268:146-147, 1963
8. Diamant EJ: Carbohydrate metabolism in emetine-poisoned rats. J Pharmacol Exp Ther 122:465-473, 1958
9. Bates T, Grunwaldt E: Ipecac poisoning. Am J Dis Child 103:169-173, 1962
10. Goodman L, Gilman A (Eds): The Pharmacologic Basis of Therapeutics, 5th Ed. New York, Macmillan, 1975, p 1076
11. Allport RB: Ipecac is not innocuous. Am J Dis Child 98: 786-787, 1959
12. Speer JD, Robertson WO, Schultz LR: Ipecacuanha poisoning another fatal case. Lancet 1:475-477, 1963
13. Smith RP, Smith DM: Acute ipecac poisoning. N Engl J Med 265:523-525, 1961
14. Rose NJ: Report of accidental poisoning death from fluid extract of ipecac. Ill Med J 137:338, 1970
15. Manno B, Manno J: Toxicology of ipecac. Clin Toxicol 10:221-242, 1977

Refer to: Nusser RA, Tarkoff MP: Legionnaires disease causing adult respiratory distress syndrome—Survival and report of open lung biopsy. West J Med 128:443-448, May 1978

# Legionnaires Disease Causing Adult Respiratory Distress Syndrome

## Survival and Report of Open Lung Biopsy

RICHARD A. NUSSER, MD
MITCHELL P. TARKOFF, MD
*Oakland, California*

LEGIONNAIRES DISEASE may result in a fulminant pneumonia. This disease occurs in both epidemic and sporadic cases. No doubt this entity is more common than was previously recognized. We successfully treated a patient in whom adult respiratory distress syndrome developed secondary to Legionnaires disease. The purpose of this report is to detail the clinical features of this case and review an open lung biopsy study done four days after hospital admission. We are not aware of previous lung biopsies done in cases of this disease. The biopsy study showed pronounced leukocytic infiltration, edema fluid and hyaline membranes. Legionnaires disease should be considered in differential diagnosis of adult respiratory distress syndrome especially if there are leukocytic histologic features.

Hyponatremia present on admission was due to inappropriate secretion of antidiuretic hormone.

From Samuel Merritt Hospital, Oakland, California.
Submitted November 16, 1977.
Reprint requests to: Richard A. Nusser, MD, Respiratory Care Associates, 3300 Webster Street, Suite 1109, Oakland, CA 94609.

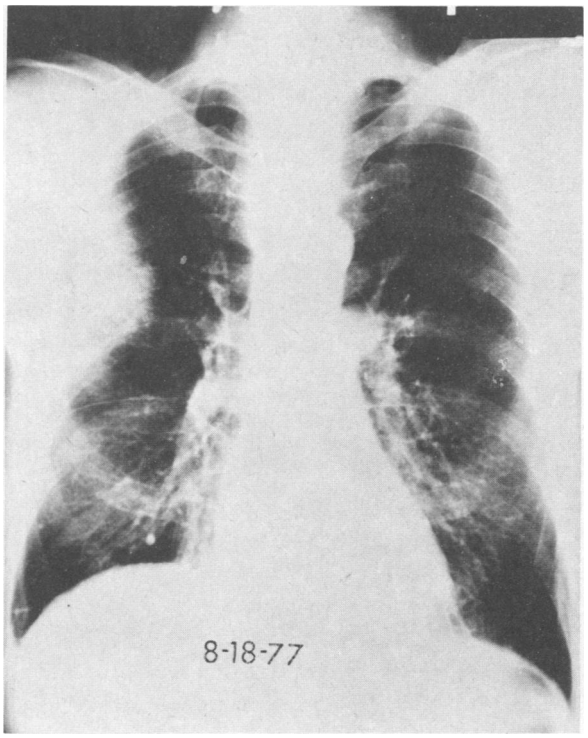


**Figure 1.**—X-ray film of the chest made on admission showing right upper lobe pneumonia.

Pulmonary function tests following discharge returned to normal. A mild relapse occurred one week following discharge.

### Report of a Case

A 58-year-old white man was admitted to Samuel Merritt Hospital, Oakland, with a chief complaint of high fever. He had been in his usual state of health until three days before admission, when malaise began. Two days before admission, nausea and retching occurred. On the morning of admission his temperature was 40°C (104°F) and an x-ray study of the chest (Figure 1) showed wedge-shaped alveolar infiltrate in the right upper lobe. The patient had noted no respiratory symptoms; specifically no cough, sputum production, chest pain, dyspnea, wheezing, sore throat or coryza. He said that diarrhea, frequency or dysuria had not been present.

A diagnosis of multiple sclerosis had been made 25 years earlier but this condition had never caused any significant problems. He had smoked one pack of cigarettes per day for the past 40 years.

On physical examination at admission, blood pressure was 140/80 mm of mercury; pulse, 92 per minute; respirations, 18 per minute, and